TENTH PROGRESS REPORT

on

CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID (Contract NAS9-13276), EPN 440), December 1 to December 31, 1973

to

NASA Johnson Space Center
Principal Investigation Management Office
Houston, Texas 77058

from

BATTELLE
Columbus Laboratories

January 17, 1974

Prepared by: D. M. J. Fubara (Co-Investigator)

A. G. Mourad (Principal Investigator)
Z. H. Byrns, Code TR6 - NASA/JSC Technical Monitor

BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

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PROGRESS

Work effort during this period was concentrated on:

(1) Deciphering and extraction of data from the S071-1 tapes from mission SL-2. For reasons given in the previous month's report, these activities involved a major effort. The numeric contents of the tapes have been successfully read and extracted. Extraction of the alphanumeric contents has not been undertaken as it requires some considerable programming effort and that information is not needed currently. We have completed computer programs for reconstruction of data tape format for generation of new data tapes compatible with our computer system as required for our investigation. The coding of the computer program is discussed later.

(2) Modification of data processing computer programs to permit rectification of the computed geoid segments. This rectification is necessitated by the fact that three different geodetic datums were used for tracking station coordinates, orbit computations and the a priori geoid data involved in the data processing. This is discussed in detail in a separate paper to be submitted soon. This paper is a revision of the paper "Geodetic Analysis of Skylab Altimetry Preliminary Data - SL/2 EREP Pass 9" which we presented at Satellite Altimetry Session of the Annual Fall Meeting of the American Geophysical Union (AGU) in San Francisco, California, December 10-13, 1973. The revision is being made to reflect both the rectification due to geodetic datum differences and new information on the preliminary altimeter data.

(3) Intensive consultation and cooperation between us and the NASA/Wallops Skylab altimeter group on resolving the issues we have previously reported on the S-193 altimeter sensor performance evaluation for SL-2 data. Some of our various contacts included the meeting between Messrs. J. T. McGoogan and Clifford Leitao of NASA/Wallops and Dr. D. M. Fubara of Battelle, at San Francisco during the AGU meeting. Copies of other associated correspondence have been set to the Technical Monitor.

(4) Review of documentations and data records received and listed in Appendix A.

DATA PROCESSING RESULTS

Significant data processing results are being incorporated into a separate paper to be submitted soon.

Appendix B describes the logistics of program READTP which has been developed to extract data from the S071-1 tapes and reformat the data into data tapes to meet our requirements.

CONCLUSION

We are continuing to get improved and encouraging results as we isolate the causes of and make corrections for various types of systematic errors in both the altimeter, the orbit data and the a priori geodetic ground truth. For instance, previously computed geodetic calibration constants have been reduced to a few tens of meters instead of over a hundred meters, as the separate paper to be submitted later will show.

PROBLEMS

There are no new major problems to be reported. NASA/JSC data are based on a geodetic reference ellipsoid of semi-major axis, a = 6,378,166m and flattening f = 1/298.3, NASA/Wallops data--a = 6,378,155m and f = 1/298.255 and the groundtruth geoid on a = 6,378,142m and f = 1/298.255. We are making corrections for these differences.

RECOMMENDATIONS

All previous recommendations that have not been implemented still stand.

NEXT PERIOD AND SUMMARY OUTLOOK

During the next period, we plan to

(1) Complete the transcription of data tapes, S071-1, to generate new data tapes as required for our investigation, now that all our S071-1 tapes from SL-2 have been received;

(2) Arrive at some conclusions with NASA/JSC and NASA/Wallops about the unique set of values and corrections for SL-2 data and orbit ephemeris;

(3) Perform additional computer programming modifications as required;

(4) Continue to investigate the possible contribution of this project and the Skylab satellite altimetry to the solution of earth and ocean physics application problems.

(5) Complete the data analysis and a write-up of a paper showing significant results from processing of SL-2 data.

TRAVEL

During this period no travel costs were charged to this project; however, a paper correlated with this project was presented at the satellite altimetry session at the AGU meeting in San Francisco, California. No travel is comtemplated for the next period.

APPENDIX A

REPORTS AND DATA RECEIVED

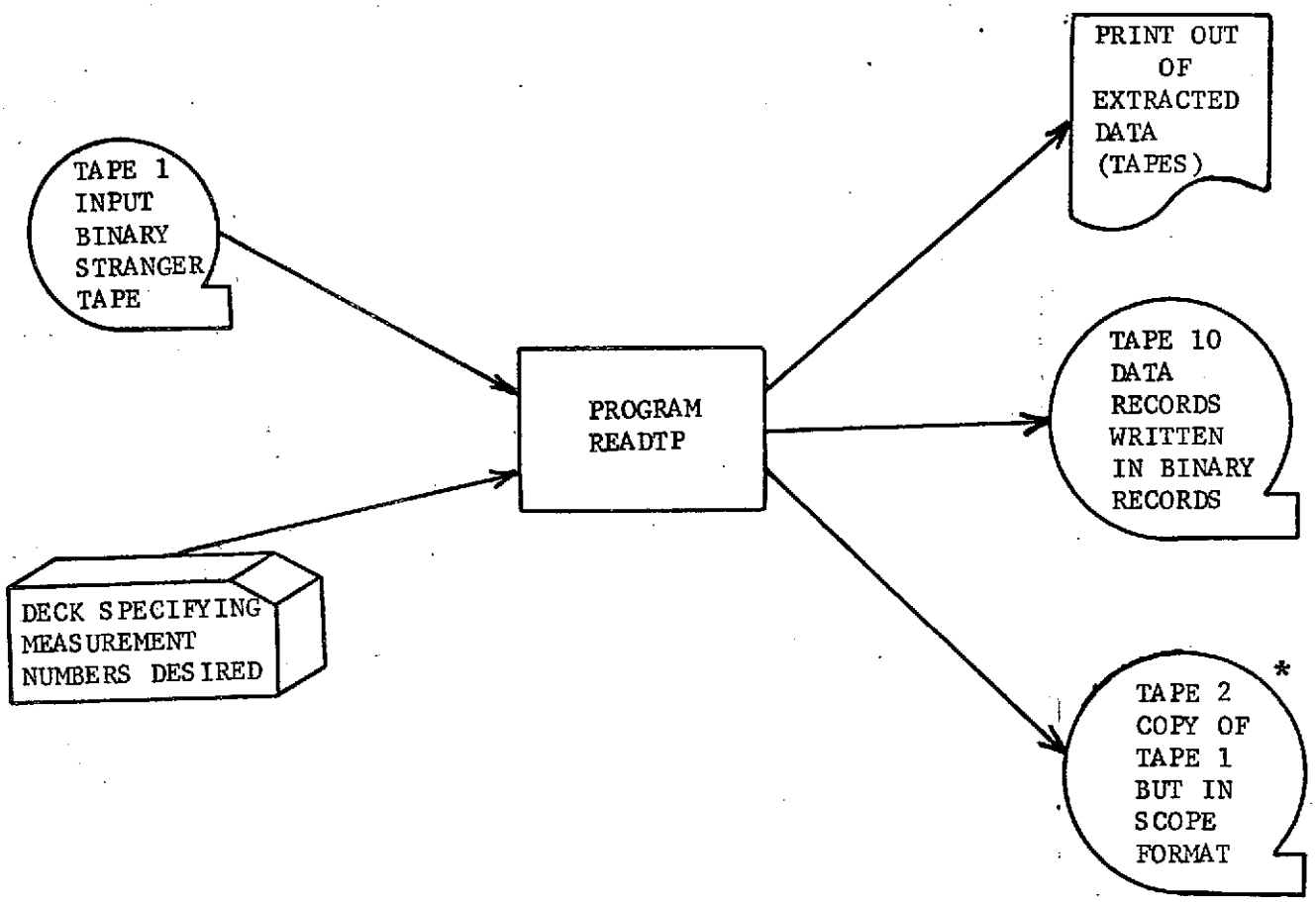
1. PHO-TR 543 Update, NASA/JSC, November, 1973.

2. SL-2 Data Records Received:

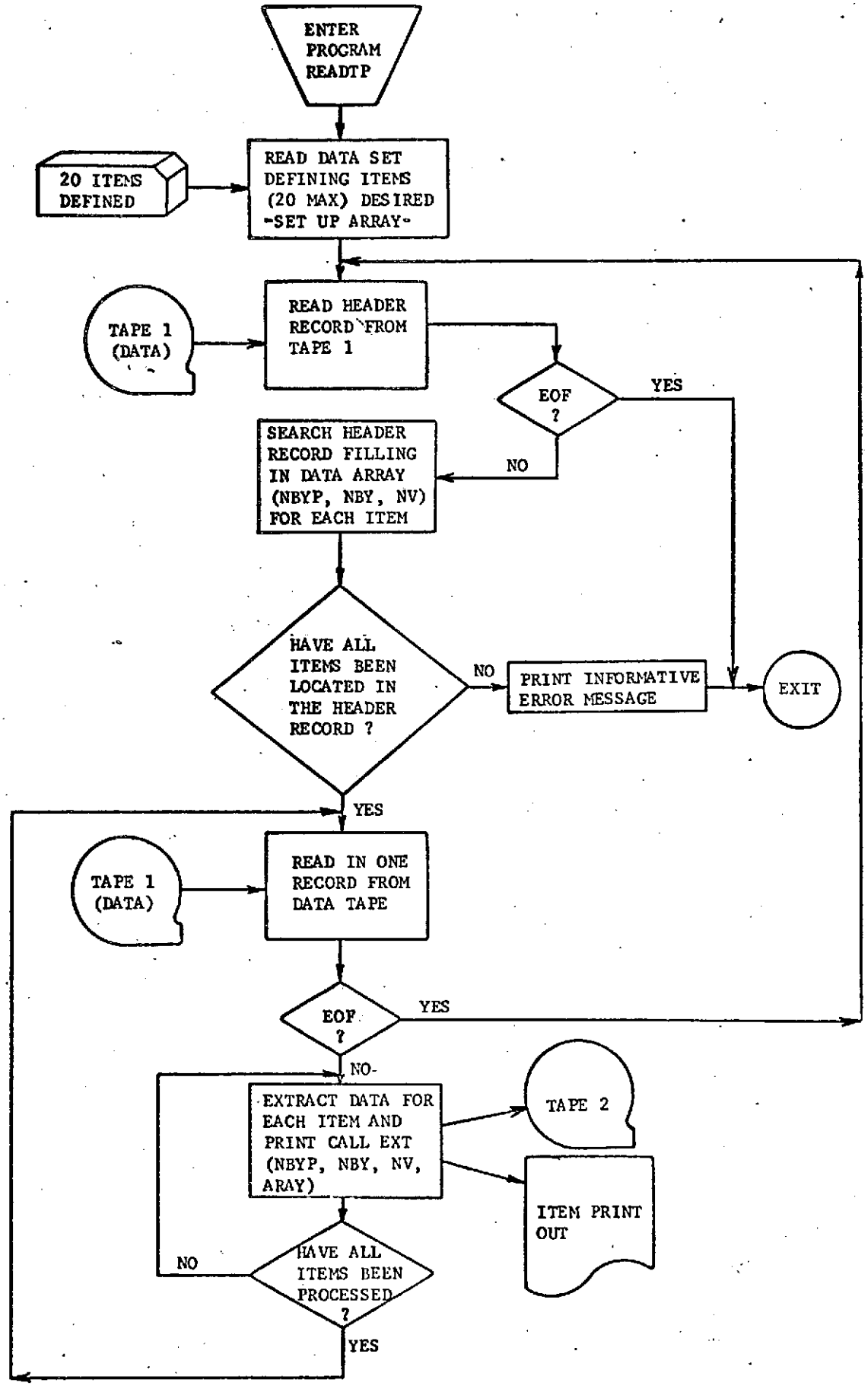
D.D.C. Accession No.	DPAR	SL-2 EREP PASS
32-15430	S193B-070-02-4-73B	
32-02816	S-193B-69-4-6-71-1	#6
32-02815	S193B-70-6-7-1-1	#7
32-02817	S193B-70-07-9-71-1	#9
32-02818	S193B-70-05-04-71-1	#4

APPENDIX B

I/O OF READTP



* Created only if BUFFER OUT writes are activated. The statements are activated by removing the "C" in column 1 of the cards.


ENTER PROGRAM READTP
20 ITEMS DEFINED
READ DATA SET DEFINING ITEMS (20 MAX) DESIRED -SET UP ARRAY-
TAPE 1 (DATA)
READ HEADER RECORD FROM TAPE 1
EOF ?
YES
NO
SEARCH HEADER RECORD FILLING IN DATA ARRAY (NBYP, NBY, NV) FOR EACH ITEM
HAVE ALL ITEMS BEEN LOCATED IN THE HEADER RECORD ?
NO
PRINT INFORMATIVE ERROR MESSAGE
EXIT
YES
TAPE 1 (DATA)
READ IN ONE RECORD FROM DATA TAPE
EOF ?
YES
NO
EXTRACT DATA FOR EACH ITEM AND PRINT CALL EXT (NBYP, NBY, NV, ARAY)
TAPE 2
ITEM PRINT OUT
HAVE ALL ITEMS BEEN PROCESSED ?
NO
YES